

sugar mills were shut down at once and all hands took to the "tall cane fields," to use a common saying. It was reported that several hundred men were in the field cutting sugar cane and windrowing it an hour after the weather bulletin was received. The army of cutters was being rapidly reinforced and it is expected that several hundred acres of cane will have been cut and stretched on the ground by to-night. A heavy freeze with the cane standing would play havoc and would mean the loss of perhaps thousands of dollars.

The following is an editorial from *The Sugar Planters Journal*, New Orleans, La., of December 20, 1902:

An evidence of the esteem in which the forecasts issued by the United States Weather Bureau at New Orleans are held, was shown by the sugar planters all over the State by their windrowing thousands of acres of cane on receiving warning of the late cold snap when the temperature fell as low as the freezing point, and in some places even lower.

This faith in the prognostications of the "weather man" was largely brought about by the accurate forecast of the destructive freeze of last December, when the loss to the sugar industry of Louisiana figured, perhaps, upward of several millions of dollars. The exact loss by that terrible freeze will never be known. Had more planters windrowed promptly upon receiving warning last year from the Weather Bureau the loss would have been greatly curtailed. The accuracy of the forecasts as now issued to the sugar planter has had much to do with the growing belief in the efficacy and wisdom of windrowing cane when a cold snap is predicted as about to swoop down on us. Fortunately these warnings are generally issued some twenty-four or thirty-six hours ahead of the freeze, thereby allowing of a considerable amount of cane being placed safe in the windrow before its advent. It is considered by many, though, as wisest not to run too great a risk of being caught with a large area of cane in the field, and we find numbers of planters disposed to windrow about the middle of December, freeze or no freeze, provided they have sufficient cane to put off the end of the campaign to as late as the middle of January.

The Tampa, Fla., *Herald*, of December 27, 1902, remarked as follows regarding the warnings:

"Heavy and damaging frost to-night" was the brief warning sent out over this section of the State yesterday by the local weather observer, but the warning, despite its brevity, was effective, and doubtless saved thousands of dollars to the planters, especially those who own large plantations, as the cold wave that struck the State was sufficient to greatly injure the pines.

Mr. W. W. Fisher, President of The United Telephone Company, Bellefontaine, Ohio, under date of December 26, 1902, addressed the following letter to Mr. C. L. Lane, Weather Bureau Displayman at Bellefontaine:

Our telephone company desires to express in writing its appreciation of the cold-wave warning given by you to our superintendent on Wednesday last. We have fifty stations in our system, which extends throughout this and adjoining counties, and this news was immediately telephoned to each station with instructions to circulate the information there. In our system are a great many farmer subscribers, and this news was given to each farmer. We take pleasure in telling you that it was appreciated a great deal more than can be expressed here. We shall be pleased indeed to communicate to our patrons throughout our system any like information that comes to you in your position as voluntary observer of the United States Weather Bureau in our city, and we shall always be glad to render you any assistance, at any time, within our power.

In connection with two storms from the Southwest and a storm that moved eastward over the Lake region, heavy falls of snow occurred in New England, northern parts of the Middle Atlantic States, the lower Lake region, and the upper Ohio and middle Missouri valleys during the first decade of the month. In the second decade of the month a succession of storms that moved eastward and then northeastward from the southern Rocky Mountain and Plateau regions caused heavy snow generally between the Mississippi River and the Rocky Mountains north of Texas, and in southern New England and the interior of New York. After the 20th precipitation was mostly in the form of rain, although considerable snow fell from the Lake region and Ohio Valley over parts of New York and New England in connection with a storm that moved from the upper Lakes to the New England coast during the 24th and 25th, remained nearly stationary off the New England coast during the 26th, and reached Nova Scotia on the 27th. Snow also attended a storm that moved southeastward

over the Rocky Mountains to Texas on the 27th and 28th and passed thence rapidly eastward. The heavy snows of the month were, as a rule, successfully forecast.

Flood conditions, due to heavy rains in the Southwest, prevailed in the Red River and tributaries during the early part of the month; by the 25th the river had fallen within its banks at all points. Ample and timely warnings in connection with the Red River flood were issued by the Weather Bureau and given the widest possible distribution in that region.

BOSTON FORECAST DISTRICT.

Ample announcement was made of all severe windstorms that passed over the district. The most pronounced disturbances were those of the 5-6th and 13-14th. During the former hurricane warnings were displayed from Boston to New Haven and were fully justified by winds of hurricane force at and in the vicinity of the display stations. The latter storm was accompanied by snow which, on account of drifting badly, delayed street and railroad traffic. Owing to timely warnings no great damage was caused to shipping by the storms of the month.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

The most important warnings of the month were issued on the 3d for weather to occur on the 5th, when cold-wave warnings were issued for eastern Texas, Arkansas, and Louisiana, and sugar planters and truck growers in Louisiana and Texas were advised that the temperature would fall to 28° in the sugar region by the morning of the 5th. These warnings, disseminated fully forty hours in advance, were practically verified throughout the district. The temperature in the sugar region of Louisiana and Texas ranged from 27° to 30° on the morning of the 5th. Cane was protected by being windrowed generally. Advices state that one planter windrowed 1500 acres; another 1200 acres, and so on throughout the sugar belt, before the lowest temperature occurred.

This is the second season that special warnings specifying the expected temperatures have been issued for the planters of Louisiana, and there have been many expressions of appreciation for such timely and accurate warnings for sugar and trucking interests. (Editorial comment of the *Sugar Planters Journal* is printed elsewhere.)

The coldest weather of the season, so far, occurred over the northeastern and extreme eastern portions of the district on the morning of the 27th, when the temperature at New Orleans fell to 28°. In the sugar region the temperature was about the same as on the 5th, ranging generally from 27° to 30°. Warnings were issued twenty-four hours in advance of this freeze advising sugar planters that the temperature would fall to 28° in the Louisiana sugar region and to 30° in the Texas sugar region, so that planters who had not finished grinding could prepare for cold weather. In commenting on the cold weather the *Times-Democrat* of December 28 says:

Throughout the sugar belt there was a temperature that contained few breaths of spring, summer, or fall weather. But the planters had been warned, and if there are those who suffered, it is their own fault. The Weather Bureau had done its duty.

I. M. Cline, Forecast Official.

CHICAGO FORECAST DISTRICT.

The most severe storm of the season crossed the upper Lake region on the night of the 2d and 3d. Storm warnings were ordered up at all stations well in advance. On the 9th warnings were again ordered at all stations, and on the 11th, 12th, and 13th warnings were displayed at nearly all stations on Lakes Michigan and Huron. A severe storm developed in

the Southwest on the 14th and moved northeastward over the upper Lake region, the center reaching the Lakes on the 15th. General warnings were displayed on both these dates.

The regular storm warning season terminated December 16, but advisory messages have been sent since that date to open ports on Lake Michigan in advance of threatening conditions.

The storm warning service rendered by the Weather Bureau during the season just passed has been very acceptable to all Lake marine interests, and practically no disasters through stress of weather overtook vessels that took advantage of the storm warnings and advisory messages. The Lake Marine News Bulletin on December 16 states as follows:

Captains give the Weather Bureau high praise for the excellence of its storm signals throughout the fall. Except the *Bannockburn*, nearly all the ships lost by foundering or stranding were well along in years, and some of them doubtless not well equipped to meet storms.

No exceptionally severe cold waves crossed over the district during the month, but the most marked condition was that which moved in from the Northwest on the 6th and 7th. Cold-wave warnings were issued for the entire district on the 6th. Warnings were again issued on the 23d and 24th and transportation companies notified.—*H. J. Cor, Professor of Meteorology.*

DENVER FORECAST DISTRICT.

On the morning of the 14th warning of a cold wave was sent to points in western Colorado and northern New Mexico; this warning was fully verified over nearly the entire area. The snowstorm of the 19th in eastern Wyoming and north-eastern Colorado, which was forecast, was the feature of the month. The attending high winds were not felt in central Colorado, but in southeastern Wyoming and the extreme northern and northeastern portions of Colorado the high velocities caused the wind to drift the snow badly, and on some railroad lines traffic was suspended three or four days. Fortunately for live stock interests, no very low temperatures attended the storm.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month was on the whole rather free from severe storms. Less rain than usual fell, and with the exception of the storm in southern California of the 16-17th the damage was slight. The most interesting feature of the month was the daily receipt of a weather message from the Pacific Ocean, through the courtesy of the Commercial Cable Company, from the cable ship *Silverton*, engaged in laying cable to Honolulu.

Southeast storm warnings were displayed on the 3d from Point Reyes to Eureka, and incoming vessels reported high southeast winds off shore.

Southeast storm warnings were displayed from San Francisco to Eureka on the 8th, and advisory messages were sent to southern ports. In the vicinity of Point Reyes a maximum wind velocity of 54 miles an hour from the south occurred on the 9th.

Heavy rains occurred in central California on the 11th. Heavy frost occurred at many points on the 14th and 15th.

The first report from the cable ship *Silverton*, when about 90 miles off shore, was received on the 15th. An interesting fact is that the steamer then experienced strong southeast wind and rain, and twenty-four hours later, when nearly 300 miles southwest of San Francisco, the wind had changed to strong northwest with confused, heavy sea. The steamer appears to have run through the northern end of the disturbance which reached the coast of southern California on December 16. Unusually heavy rains occurred on the 17th from Point Conception southward. The *Silverton*, then about 500 miles southwest of San Francisco, reported terrific seas all

during the night of the 16th, with a heavy swell on the 17th and indications of better weather. The forecasts of rain for southern California for this period were verified. The winds recorded at Los Angeles and San Diego during this period do not indicate any marked disturbance in their vicinity, yet press dispatches would indicate that considerable damage was done near Terminal Island. The Pacific Mail steamer *Barracouta* reports that on the 17th, 20 miles off Point Conception, a severe storm was encountered, high waves sweeping clear over the vessel. At both observations on the 17th the wind at San Louis Obispo was reported as light from the west. The last decade of the month was marked by numerous frosts. Ample warnings were given and it is believed that but little injury resulted.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

The month was wetter than usual in the western half of the North Pacific States, while east of the Cascades the precipitation averaged slightly below normal. Several storms of unusual severity passed over the district, for which warnings were ordered well in advance.—*E. A. Beals, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	2, a.m..	43	123	4, a.m..	40	97	1,625	2.0	812	38.8
II.....	2, p.m..	58	105	7, a.m..	45	67	1,000	1.5	667	27.8
III.....	4, p.m..	27	97	10, p.m..	32	65	2,150	2.5	860	35.8
IV.....	6, p.m..	54	114	13, a.m..	48	68	3,000	4.0	750	31.2
V.....	10, a.m..	58	109	16, a.m..	46	60	1,950	3.0	650	27.1
VI.....	12, a.m..	50	100	20, a.m..	32	65	2,400	4.0	600	25.0
VII.....	13, p.m..	50	120	24, p.m..	48	68	4,300	6.5	662	27.6
VIII.....	20, p.m..	54	114	29, a.m..	32	65	2,800	4.0	700	29.2
IX.....	24, p.m..	58	105	31, p.m..	40	75	3,000	4.5	667	27.8
	27, p.m..	41	114				3,250	4.0	812	38.8
Sums.....							25,475	36.0	7,180	299.1
Mean of 10 paths.....							2,548		718	29.9
Mean of 36.0 days.....									708	29.5
Low areas.										
I.....	30, p.m..	48	125	4, a.m..	45	64	3,800	3.5	1,086	45.2
II.....	3, a.m..	30	95	5, p.m..	46	60	2,225	2.5	890	37.1
III.....	3, p.m..	51	120	5, p.m..	45	93	1,675	2.0	838	34.9
IV.....	10, p.m..	43	123	14, a.m..	32	65	3,550	3.5	1,014	42.2
V.....	13, a.m..	33	115	17, p.m..	48	68	3,450	4.5	767	32.0
VI.....	18, p.m..	35	106	22, a.m..	48	68	2,325	3.5	664	27.7
VII.....	22, a.m..	52	121	28, a.m..	46	60	3,650	6.0	608	25.3
VIII.....	26, a.m..	51	120	29, p.m..	48	86	1,625	3.5	464	19.3
IX.....	27, a.m..	41	105	29, a.m..	32	88	1,500	2.0	750	31.2
Sums.....							23,800	31.0	7,081	294.9
Mean of 9 paths.....							2,633		787	32.8
Mean of 31.0 days.....									768	32.0

* November.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk, Forecast Division.*

RIVERS AND FLOODS.

The Mississippi River at St. Paul, Minn., was closed by ice on the 3d, and at the close of the month it was blocked to within a short distance of Davenport, Iowa.

At the close of the corresponding month of 1901 the river was frozen nearly 200 miles farther south to Hannibal, Mo., and from the 19th to the 26th, inclusive, was practically blocked from Chester, Ill., to Cairo, Ill.

Heavy floating ice at Keokuk, Iowa, on the 8th terminated navigation for the season in that vicinity, while from St. Louis,